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EXAMINER	
PRENTY, MARK V	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/262,657	Applicant(s) YAMAZAKI et al.
	Examiner Prenty	Art Unit 2822

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address* --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *three* MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☒ Responsive to communication(s) filed on *Dec 24, 2002*.

2a) ☐ This action is **FINAL.** 2b) ☒ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) *1, 2, 4, 5, 7, 8, 10, 11, 13, 14, and 30-50* is/are pending in the application.

4a) Of the above, claim(s) _____ is/are withdrawn from consideration.

5) ☐ Claim(s) _____ is/are allowed.

6) ☒ Claim(s) *1, 2, 4, 5, 7, 8, 10, 11, 13, 14, and 30-50* is/are rejected.

7) ☐ Claim(s) _____ is/are objected to.

8) ☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

9) ☐ The specification is objected to by the Examiner.

10) ☐ The drawing(s) filed on _____ is/are a) ☐ accepted or b) ☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13) ☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) ☐ All b) ☐ Some* c) ☐ None of:

1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

*See the attached detailed Office action for a list of the certified copies not received.

14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

a) ☐ The translation of the foreign language provisional application has been received.

15) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s). *23*
4) ☐ Interview Summary (PTO-413) Paper No(s). _____
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

This Office Action is in response to the RCE filed December 24, 2002.

Claims 43 and 48, which depend on independent claim 36, are rejected under 35 U.S.C. §112, first paragraph, because the specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the invention.

Specifically, independent claim 36 recites, among other things, a first semiconductor film comprising crystalline silicon formed over the substrate and a second semiconductor film comprising amorphous silicon formed over the substrate. This corresponds to Fig. 5B, which illustrates a first semiconductor film 503 comprising crystalline silicon and a second semiconductor film 504 comprising amorphous silicon formed over a substrate.

However, dependent claims 43 and 48, which recite that one (claim 43) or both (claim 48) of independent claim 36's crystalline and amorphous films further comprise a metal selected from the group consisting of nickel, iron, cobalt and platinum, are not enabled by the specification, which discloses that the Fig. 5 embodiment, the only embodiment commensurate in scope with independent claim 36's recitation of a crystalline film and an amorphous film, is formed without using a catalytic element such as nickel (see the specification at page 12, line 20, through page 13, line 17).

Claims 43 and 48, which depend on independent claim 36, are thus rejected under 35 U.S.C. §112, first paragraph, because the specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the invention.

Claims 1, 2, 4, 5, 10, 11, 30, 31, 33, 34, 39-42, 44-47, 49 and 50 are rejected under 35 U.S.C. §103(a) as being unpatentable over Zhang et al. (United States

Patent 5,614,733 cited in the Information Disclosure Statement filed April 23, 2001, hereinafter Zhang et al. '733) together with Saraswat et al. (United States Patent 5,250,818, already of record).

With respect to independent claim 1, Zhang et al. '733 disclose a semiconductor device (see the entire patent, including the Fig. 5 embodiment, for example) comprising: a substrate 21; a first thin film transistor having a first active layer 26a comprising silicon (Si) formed over said substrate; and a second thin film transistor having a second active layer 26b comprising silicon formed over said substrate wherein said second active layer is not intentionally added with germanium.

Zhang et al. '733's semiconductor device is an active-matrix circuit. The first thin film transistor having a first active layer 26a is part of a peripheral driver circuit and the second thin film transistor having a second active layer 26b is part of the matrix region.

The difference between Zhang et al. '733's semiconductor device and claim 1's semiconductor device is Zhang et al. '733's first thin film transistor's active layer comprises silicon while claim 1's first thin film transistor's active layer comprises $Si_{1-x}Ge_x$ where $0<X<1$.

Saraswat et al. teach forming an active-matrix circuit's peripheral driver transistors from $Si_{1-x}Ge_x$ where $0<X<1$ instead of silicon, because the resulting transistors have significantly improved electrical characteristics, such as higher mobility (see the entire patent, particularly column 1, lines 20-58, and column 2, lines 19-43).

It would have been obvious to one skilled in this art to form Zhang et al. '733's first thin film transistor's active layer 26a of $Si_{1-x}Ge_x$ where $0<X<1$ instead of silicon, in

order to improve that driver circuit transistor's electrical characteristics, as taught by Saraswat et al.

Claim 1 is thus rejected under 35 U.S.C. §103(a) as being unpatentable over Zhang et al. '733 together with Saraswat et al.

With respect to independent claim 2, Zhang et al. '733 disclose a semiconductor device (see the entire patent, including the Fig. 5 embodiment, for example) comprising: a substrate 21; a first thin film transistor having a first active layer 26a comprising silicon (Si) formed over said substrate; and a second thin film transistor having a second active layer 26b comprising silicon formed over said substrate, wherein said second active layer contains no germanium, wherein said first thin film transistor constitutes a CMOS circuit.

Zhang et al. '733's semiconductor device is an active-matrix circuit. The first thin film transistor having a first active layer 26a is part of a peripheral driver circuit and the second thin film transistor having a second active layer 26b is part of the matrix region.

The difference between Zhang et al. '733's semiconductor device and claim 2's semiconductor device is Zhang et al. '733's first thin film transistor's active layer comprises silicon while claim 2's first thin film transistor's active layer comprises $Si_{1-X}Ge_X$ where $0<X<1$.

Saraswat et al. teach forming an active-matrix circuit's peripheral driver transistors from $Si_{1-X}Ge_X$ where $0<X<1$ instead of silicon, because the resulting transistors have significantly improved electrical characteristics, such as higher mobility (see the entire patent, particularly column 1, lines 20-58, and column 2, lines 19-43).

It would have been obvious to one skilled in this art to form Zhang et al. '733's first thin film transistor's active layer 26a of $Si_{1-x}Ge_x$ where $0<X<1$ instead of silicon, in order to improve that driver circuit transistor's electrical characteristics, as taught by Saraswat et al.

Claim 2 is thus rejected under 35 U.S.C. §103(a) as being unpatentable over Zhang et al. '733 together with Saraswat et al.

With respect to dependent claims 4 and 5, Saraswat et al's $Si_{1-x}Ge_x$ is polycrystalline silicon germanium (see Saraswat et al's Abstract, for example) and Zhang et al. '733's silicon 26b is polysilicon.

Claims 4 and 5 are thus rejected under 35 U.S.C. §103(a) as being unpatentable over Zhang et al. '733 together with Saraswat et al.

With respect to dependent claims 10 and 11, Zhang et al. '733's first active layer 26a further includes nickel at a concentration of $1x10^{15}$ to $1x10^{16}$ atoms/cm^3 (see column 9, lines 64-66).

Claims 10 and 11 are thus rejected under 35 U.S.C. §103(a) as being unpatentable over Zhang et al. '733 together with Saraswat et al.

With respect to independent claim 30, Zhang et al. '733 disclose a semiconductor device having an active matrix display device (see the entire patent, particularly the Fig. 3 disclosure and the Fig. 5 embodiment thereof, for example), said display device comprising: a substrate 21 having an insulating surface; a plurality of pixel electrodes arranged in a matrix formed over said substrate; a plurality of first thin film transistors for switching said pixel electrodes and formed over said substrate; a driver circuit formed over said substrate for driving said plurality of first thin film transistors, said driver circuit comprising at least one second thin film transistor; each

of said first thin film transistors and said second thin film transistor comprising: a semiconductor film 23 comprising silicon and including at least one channel region; a gate insulating film 27 adjacent to said channel region; and a gate electrode 28 adjacent to said gate insulating film.

The difference between Zhang et al. '733's semiconductor device and claim 30's semiconductor device is claim 30 recites: "wherein the semiconductor film of said second thin film transistor contains germanium and the semiconductor film of the first thin film transistors is not intentionally added with germanium and a concentration of germanium in the semiconductor film of the second thin film transistor is higher than a concentration of germanium in the semiconductor film of the first thin film transistor" (i.e., the difference is that the semiconductor film of Zhang et al. '733's and claim 30's driver circuit transistors comprise silicon (Si) and $Si_{1-x}Ge_x$ where $0<X<1$, respectively).[1]

Saraswat et al. teach forming an active-matrix circuit's peripheral driver transistors from $Si_{1-x}Ge_x$ where $0<X<1$ instead of silicon, because the resulting transistors have significantly improved electrical characteristics, such as higher mobility (see the entire patent, particularly column 1, lines 20-58, and column 2, lines 19-43).

It would have been obvious to one skilled in this art to form Zhang et al. '733's driver/second thin film transistors' active layer 26a of $Si_{1-x}Ge_x$ where $0<X<1$ instead of

[1] The applicants' allegation: "The open ended nature of the claim allows for the possibility that the germanium is part of polycrystalline silicon germanium film," is somewhat misleading and contrary to the specification. Specifically, it is not merely a "possibility" that the germanium is part of the polycrystalline silicon germanium film; it is, to use the specification's own word, a "necessity" that the germanium is part of the polycrystalline silicon germanium film, as the specification makes clear throughout, particularly at page 6, lines 26-29: "At this time, although the adding conditions may be appropriately determined by the practitioner, there is a necessity of adding germanium to fulfill a composition of $Si_{1-x}Ge_x$ $(0<x<1)$," (emphasis added).

silicon, in order to improve the driver circuit transistors' electrical characteristics, as taught by Saraswat et al.

Claim 30 is thus rejected under 35 U.S.C. §103(a) as being unpatentable over Zhang et al. '733 together with Saraswat et al.

With respect to dependent claim 31, the semiconductor film 26b of said plurality of Zhang et al. '733's first thin film transistors is not added with germanium while the semiconductor film 26a of Zhang et al. '733's driver/second thin film transistor is added with germanium (as per Saraswat et al's teaching, as explained above in the discussion of independent claim 30).

Claim 31 is thus rejected under 35 U.S.C. §103(a) as being unpatentable over Zhang et al. '733 together with Saraswat et al.

With respect to independent claim 33, Zhang et al. '733 disclose a semiconductor device (see the entire patent, including the Fig. 5 embodiment, for example) comprising: a substrate 21 having an insulating surface; a first thin film transistor formed over said substrate, said first thin film transistor comprising: a first semiconductor film 26a comprising crystalline silicon formed over said substrate and having a channel region; a first insulating film 27 adjacent to said first semiconductor film; and a first gate electrode 28(a or b) adjacent to said first gate insulating film; a second thin film transistor formed over said substrate, said second thin film transistor comprising: a second semiconductor film 26b comprising crystalline silicon formed over said substrate and having a channel region; a second gate insulating film 27 adjacent to said second semiconductor film; and a second gate electrode 28c adjacent to said second gate insulating film.

Zhang et al. '733's semiconductor device is an active-matrix circuit. The first

thin film transistor having a first active layer 26a is part of a peripheral driver circuit and the second thin film transistor having a second active layer 26b is part of the matrix region.

The difference between Zhang et al. '733's semiconductor device and claim 33's semiconductor device is claim 33 recites: "wherein said first semiconductor film contains germanium at a higher concentration than said second semiconductor film and the second semiconductor film is not intentionally added with germanium" (i.e., the difference is Zhang et al. '733's first thin film transistor's active layer 26a comprises silicon while claim 33's first thin film transistor's active layer comprises $Si_{1-x}Ge_x$ where $0<X<1$).

Saraswat et al. teach forming an active-matrix circuit's peripheral driver transistors from $Si_{1-x}Ge_x$ where $0<X<1$ instead of silicon, because the resulting transistors have significantly improved electrical characteristics, such as higher mobility (see the entire patent, particularly column 1, lines 20-58, and column 2, lines 19-43).

It would have been obvious to one skilled in this art to form Zhang et al. '733's first thin film transistor's active layer 26a of $Si_{1-x}Ge_x$ where $0<X<1$ instead of silicon, in order to improve that driver circuit transistor's electrical characteristics, as taught by Saraswat et al.

Claim 33 is thus rejected under 35 U.S.C. §103(a) as being unpatentable over Zhang et al. '733 together with Saraswat et al.

With respect to dependent claim 34, Zhang et al. '733's first semiconductor film 26a is added with germanium (as per Saraswat et al's teaching, as explained above in the discussion of independent claim 33) while Zhang et al's second semiconductor

film 26b is not intentionally added with germanium.

Claim 34 is thus rejected under 35 U.S.C. §103(a) as being unpatentable over Zhang et al. '733 together with Saraswat et al.

With respect to dependent claims 39-42, Zhang et al. '733's first active layer 26a further comprises nickel (see column 9, lines 64-66).

Claims 39-42 are thus rejected under 35 U.S.C. §103(a) as being unpatentable over Zhang et al. '733 together with Saraswat et al.

With respect to dependent claims 44-47, each of Zhang et al. '733's first and second active layers 26a and 26b further comprises nickel (see the Fig. 2 embodiment).

Claims 44-47 are thus rejected under 35 U.S.C. §103(a) as being unpatentable over Zhang et al. '733 together with Saraswat et al.

With respect to independent claim 49, Zhang et al. '733 disclose a semiconductor device (see the entire patent, including the Fig. 5 embodiment, for example) comprising: a substrate 21; an underlying layer 22 formed over the substrate; a first thin film transistor having a first active layer 26a comprising silicon (Si) formed over said underlying layer; and a second thin film transistor having a second active layer 26b comprising silicon formed over said underlying layer wherein said second active layer is not intentionally doped with germanium.

Zhang et al. '733's semiconductor device is an active-matrix circuit. The first thin film transistor having a first active layer 26a is part of a peripheral driver circuit and the second thin film transistor having a second active layer 26b is part of the matrix region.

The difference between Zhang et al. '733's semiconductor device and claim

49's semiconductor device is Zhang et al. '733's first thin film transistor's active layer 26a comprises silicon while claim 49's first thin film transistor's active layer comprises $Si_{1-x}Ge_x$ where $0<X<1$.

Saraswat et al. teach forming an active-matrix circuit's peripheral driver transistors from $Si_{1-x}Ge_x$ where $0<X<1$ instead of silicon, because the resulting transistors have significantly improved electrical characteristics, such as higher mobility (see the entire patent, particularly column 1, lines 20-58, and column 2, lines 19-43).

It would have been obvious to one skilled in this art to form Zhang et al. '733's first thin film transistor's active layer 26a of $Si_{1-x}Ge_x$ where $0<X<1$ instead of silicon, in order to improve that driver circuit transistor's electrical characteristics, as taught by Saraswat et al.

Claim 49 is thus rejected under 35 U.S.C. §103(a) as being unpatentable over Zhang et al. '733 together with Saraswat et al.

With respect to dependent claim 50, Zhang et al. '733's underlying film 22 is silicon oxide (see column 9, lines 55-60).

Claim 50 is thus rejected under 35 U.S.C. §103(a) as being unpatentable over Zhang et al. '733 together with Saraswat et al.

Claims 1, 2, 7, 8, 30, 31, 36, 37, 49 and 50 are rejected under 35 U.S.C. §103(a) as being unpatentable over Zhang et al. (United States Patent 5,648,277 cited in the Information Disclosure Statement filed March 4, 1999, hereinafter Zhang et al. '277) together with Saraswat et al. (United States Patent 5,250,818, already of record).

With respect to independent claim 1, Zhang et al. '277 disclose a semiconductor device (see the entire patent, particularly the Fig. 6 disclosure) comprising: a substrate

1201; a first thin film transistor 1232 (or 1233) having a first active layer 1203 comprising silicon (Si) formed over said substrate; and a second thin film transistor 1234 having a second active layer 1204 comprising silicon formed over said substrate wherein said second active layer is not intentionally added with germanium.

Zhang et al. '277's semiconductor device is an active-matrix circuit. The first thin film transistor 1232 (or 1233) having a first active layer 1203 is part of a peripheral driver circuit and the second thin film transistor 1234 having a second active layer 1204 is part of the active matrix region (see column 14, lines 61-65, for example).

The difference between Zhang et al. '277's semiconductor device and claim 1's semiconductor device is Zhang et al. '277's first thin film transistor's active layer 1203 comprises silicon while claim 1's first thin film transistor's active layer comprises $Si_{1-x}Ge_x$ where $0<X<1$.

Saraswat et al. teach forming an active-matrix circuit's peripheral driver transistors from $Si_{1-x}Ge_x$ where $0<X<1$ instead of silicon, because the resulting transistors have significantly improved electrical characteristics, such as higher mobility (see the entire patent, particularly column 1, lines 20-58, and column 2, lines 19-43).

It would have been obvious to one skilled in this art to form Zhang et al. '277's first thin film transistor's active layer 1203 of $Si_{1-x}Ge_x$ where $0<X<1$ instead of silicon, in order to improve that driver circuit transistor's electrical characteristics, as taught by Saraswat et al.

Claim 1 is thus rejected under 35 U.S.C. §103(a) as being unpatentable over Zhang et al. '277 together with Saraswat et al.

With respect to independent claim 2, Zhang et al. '277 disclose a semiconductor

device (see the entire patent, particularly the Fig. 6 disclosure) comprising: a substrate 1201; a first thin film transistor 1232/1233 having a first active layer 1203 comprising silicon (Si) formed over said substrate; and a second thin film transistor 1234 having a second active layer 1204 comprising silicon formed over said substrate, wherein said second active layer contains no germanium, wherein said first thin film transistor constitutes a CMOS circuit.

Zhang et al. '277's semiconductor device is an active-matrix circuit. The first thin film transistor 1232/1233 having a first active layer 1203 is part of a peripheral driver circuit and the second thin film transistor 1234 having a second active layer 1204 is part of the active matrix region (see column 14, lines 61-65, for example).

The difference between Zhang et al. '277's semiconductor device and claim 2's semiconductor device is Zhang et al. '277's first thin film transistor's active layer 1203 comprises silicon while claim 2's first thin film transistor's active layer comprises $Si_{1-x}Ge_x$ where $0<X<1$.

Saraswat et al. teach forming an active-matrix circuit's peripheral driver transistors from $Si_{1-x}Ge_x$ where $0<X<1$ instead of silicon, because the resulting transistors have significantly improved electrical characteristics, such as higher mobility (see the entire patent, particularly column 1, lines 20-58, and column 2, lines 19-43).

It would have been obvious to one skilled in this art to form Zhang et al. '277's first thin film transistor's active layer 1203 of $Si_{1-x}Ge_x$ where $0<X<1$ instead of silicon, in order to improve that driver circuit transistor's electrical characteristics, as taught by Saraswat et al.

Claim 2 is thus rejected under 35 U.S.C. §103(a) as being unpatentable over

Zhang et al. '277 together with Saraswat et al.

With respect to dependent claims 7 and 8, Saraswat et al's $Si_{1-x}Ge_x$ is polycrystalline silicon germanium (see the Abstract, for example) and Zhang et al. '277's silicon 1204 remains amorphous silicon (see column 15, line 16).

Claims 7 and 8 are thus rejected under 35 U.S.C. §103(a) as being unpatentable over Zhang et al. '277 together with Saraswat et al.

With respect to independent claim 30, Zhang et al. '277 disclose a semiconductor device having an active matrix display device (see the entire patent, particularly the Figs. 6-7 disclosure), said display device comprising: a substrate 1201 having an insulating surface; a plurality of pixel electrodes 9 arranged in a matrix formed over said substrate; a plurality of first thin film transistors 1234 for switching said pixel electrodes and formed over said substrate; a driver circuit formed over said substrate for driving said plurality of first thin film transistors, said driver circuit comprising at least one second thin film transistor 1232/1233; each of said first thin film transistors and said second thin film transistor comprising: a semiconductor film (1204 and 1203, respectively) comprising silicon and including at least one channel region; a gate insulating film adjacent to said channel region; and a gate electrode adjacent to said gate insulating film.

The difference between Zhang et al. '277's semiconductor device and claim 30's semiconductor device is claim 30 recites: "wherein the semiconductor film of said second thin film transistor contains germanium and the semiconductor film of the first thin film transistors is not intentionally added with germanium and a concentration of germanium in the semiconductor film of the second thin film transistor is higher than a concentration of germanium in the semiconductor film of the first thin film transistor"

(i.e., the difference is that the semiconductor film of Zhang et al. '277's and claim 30's driver circuit transistors comprise silicon (Si) and $Si_{1-x}Ge_x$ where $0<X<1$, respectively).[2]

Saraswat et al. teach forming an active-matrix circuit's peripheral driver transistors from $Si_{1-x}Ge_x$ where $0<X<1$ instead of silicon, because the resulting transistors have significantly improved electrical characteristics, such as higher mobility (see the entire patent, particularly column 1, lines 20-58, and column 2, lines 19-43).

It would have been obvious to one skilled in this art to form Zhang et al. '277's driver/second thin film transistors' active layer 1203 of $Si_{1-x}Ge_x$ where $0<X<1$ instead of silicon, in order to improve the driver circuit transistors' electrical characteristics, as taught by Saraswat et al.

Claim 30 is thus rejected under 35 U.S.C. §103(a) as being unpatentable over Zhang et al. '277 together with Saraswat et al.

With respect to dependent claim 31, the semiconductor film 1204 of said plurality of Zhang et al. '277's first thin film transistors is not added with germanium while the semiconductor film 1203 of Zhang et al. '277's driver/second thin film transistor is added with germanium (as per Saraswat et al's teaching, as explained above in the discussion of independent claim 30).

Claim 31 is thus rejected under 35 U.S.C. §103(a) as being unpatentable over

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2 The applicants' allegation: "The open ended nature of the claim allows for the possibility that the germanium is part of polycrystalline silicon germanium film," is somewhat misleading and contrary to the specification. Specifically, it is not merely a "possibility" that the germanium is part of the polycrystalline silicon germanium film; it is, to use the specification's own word, a "necessity" that the germanium is part of the polycrystalline silicon germanium film, as the specification makes clear throughout, particularly at page 6, lines 26-29: "At this time, although the adding conditions may be appropriately determined by the practitioner, there is a necessity of adding germanium to fulfill a composition of $Si_{1-x}Ge_x$ $(0<x<1)$," (emphasis added).

Zhang et al. '277 together with Saraswat et al.

With respect to independent claim 36, Zhang et al. '277 disclose a semiconductor device (see the entire patent, particularly the Fig. 6 disclosure) comprising: a substrate 1201 having an insulating surface; a first thin film transistor 1232 (or 1233) formed over said substrate, said first thin film transistor comprising: a first semiconductor film 1203 comprising crystalline silicon formed over said substrate and having a channel region; a first gate insulating film adjacent to said first semiconductor film; and a first gate electrode adjacent to said first gate insulating film; a second thin film transistor 1234 formed over said substrate, said second thin film transistor comprising: a second semiconductor film 1204 comprising amorphous silicon (see column 15, line 16) formed over said substrate and having a channel region; a second gate insulating film adjacent to said second semiconductor film; and a second gate electrode adjacent to said second gate insulating film.

Zhang et al. '277's semiconductor device is an active-matrix circuit. The first thin film transistor 1232 (or 1233) having a first active layer 1203 is part of a peripheral driver circuit and the second thin film transistor 1234 having a second active layer 1204 is part of the active matrix region (see column 14, lines 61-65, for example).

The difference between Zhang et al. '277's semiconductor device and claim 36's semiconductor device is claim 36 recites: "wherein said first semiconductor film contains germanium at a higher concentration than said second semiconductor film and the second semiconductor film is not intentionally added with germanium" (i.e., the difference is Zhang et al. '277's first thin film transistor's active layer 1203 comprises silicon while claim 36's first thin film transistor's active layer comprises $Si_{1-X}Ge_X$ where $0<X<1$).

Saraswat et al. teach forming an active-matrix circuit's peripheral driver transistors from $Si_{1-X}Ge_X$ where $0<X<1$ instead of silicon, because the resulting transistors have significantly improved electrical characteristics, such as higher mobility (see the entire patent, particularly column 1, lines 20-58, and column 2, lines 19-43).

It would have been obvious to one skilled in this art to form Zhang et al. '277's first thin film transistor's active layer 1203 of $Si_{1-X}Ge_X$ where $0<X<1$ instead of silicon, in order to improve that driver circuit transistor's electrical characteristics, as taught by Saraswat et al.

Claim 36 is thus rejected under 35 U.S.C. §103(a) as being unpatentable over Zhang et al. '277 together with Saraswat et al.

With respect to dependent claim 37, Zhang et al. '277's first semiconductor film 1203 is added with germanium (as per Saraswat et al's teaching, as explained above in the discussion of independent claim 36) while the second semiconductor film 1204 is not intentionally added with germanium.

Claim 37 is thus rejected under 35 U.S.C. §103(a) as being unpatentable over Zhang et al. '277 together with Saraswat et al.

With respect to independent claim 49, Zhang et al. '277 disclose a semiconductor device (see the entire patent, particularly the Fig. 6 disclosure) comprising: a substrate 1201; an underlying layer 1202 formed over the substrate; a first thin film transistor 1232 (or 1233) having a first active layer 1203 comprising silicon (Si) formed over said underlying layer; and a second thin film transistor 1234 having a second active layer 1204 comprising silicon formed over said underlying layer wherein said second active layer is not intentionally doped with germanium.

Zhang et al. '277's semiconductor device is an active-matrix circuit. The first thin film transistor 1232 (or 1233) having a first active layer 1203 is part of a peripheral driver circuit and the second thin film transistor 1234 having a second active layer 1204 is part of the active matrix region (see column 14, lines 61-65, for example).

The difference between Zhang et al. '277's semiconductor device and claim 49's semiconductor device is Zhang et al. '277's first thin film transistor's active layer comprises silicon while claim 49's first thin film transistor's active layer comprises $Si_{1-x}Ge_x$ where $0<X<1$.

Saraswat et al. teach forming an active-matrix circuit's peripheral driver transistors from $Si_{1-x}Ge_x$ where $0<X<1$ instead of silicon, because the resulting transistors have significantly improved electrical characteristics, such as higher mobility (see the entire patent, particularly column 1, lines 20-58, and column 2, lines 19-43).

It would have been obvious to one skilled in this art to form Zhang et al. '277's first thin film transistor's active layer 1203 of $Si_{1-x}Ge_x$ where $0<X<1$ instead of silicon, in order to improve that driver circuit transistor's electrical characteristics, as taught by Saraswat et al.

Claim 49 is thus rejected under 35 U.S.C. §103(a) as being unpatentable over Zhang et al. '277 together with Saraswat et al.

With respect to dependent claim 50, Zhang et al. '277's underlying film 1202 is silicon oxide (see column 15, line 1).

Claim 50 is thus rejected under 35 U.S.C. §103(a) as being unpatentable over Zhang et al. '277 together with Saraswat et al.

Claim 38 is rejected under 35 U.S.C. §103(a) as being unpatentable over

Zhang et al. (United States Patent 5,648,277 cited in the Information Disclosure Statement filed March 4, 1999, hereinafter Zhang et al. '277) together with Saraswat et al. (United States Patent 5,250,818, already of record) and Yamazaki et al (United States Patent 6,160,271, already of record).

Specifically, the difference between the obvious Zhang et al. '277 / Saraswat et al. semiconductor device (discussed above with respect to independent claim 36) and dependent claim 38 is claim 38 recites that the semiconductor device is used in a variety of electronic devices.

Yamazaki et al. teach using semiconductor devices such as Zhang et al's semiconductor device in the claimed variety of electronic devices (see Yamazaki et al's Fig. 7 disclosure).

It would have been further obvious to one skilled in this art to use the obvious Zhang et al. '277 / Saraswat et al. semiconductor device in the claimed variety of electronic devices, as taught by Yamazaki et al.

Claim 38 is thus rejected under 35 U.S.C. §103(a) as being unpatentable over Zhang et al. '277 together with Saraswat et al. and Yamazaki et al.

Claims 1, 2, 4, 5, 10, 11, 13, 14, 30-35, 39-42, 44-47 and 49 are rejected under 35 U.S.C. §103(a) as being unpatentable over Yamazaki et al. (United States Patent 6,160,271, already of record) together with Saraswat et al. (United States Patent 5,250,818, already of record).

With respect to independent claim 1, Yamazaki et al. disclose a semiconductor device (see the entire patent, particularly the Figs. 1-4 disclosure) comprising: a substrate 101; a first thin film transistor having a first active layer 109 (or 110) comprising silicon (Si) formed over said substrate; and a second thin film transistor

having a second active layer 111 comprising silicon formed over said substrate wherein said second active layer is not intentionally added with germanium.

Yamazaki et al's semiconductor device is an active-matrix circuit. The first thin film transistor having a first active layer 109 (and/or 110) is part of a peripheral driver circuit and the second thin film transistor having a second active layer 111 is part of the pixel matrix circuit (see column 3, lines 31-39, and column 4, lines 31-41, for example).

The difference between Yamazaki et al's semiconductor device and claim 1's semiconductor device is Yamazaki et al's first thin film transistor's active layer 109 (and/or 110) comprises silicon while claim 1's first thin film transistor's active layer comprises $Si_{1-x}Ge_x$ where $0<X<1$.

Saraswat et al. teach forming an active-matrix circuit's peripheral driver transistors from $Si_{1-x}Ge_x$ where $0<X<1$ instead of silicon, because the resulting transistors have significantly improved electrical characteristics, such as higher mobility (see the entire patent, particularly column 1, lines 20-58, and column 2, lines 19-43).

It would have been obvious to one skilled in this art to form Yamazaki et al's first thin film transistor's active layer 109 (and/or 110) of $Si_{1-x}Ge_x$ where $0<X<1$ instead of silicon, in order to improve that driver circuit transistor's electrical characteristics, as taught by Saraswat et al.

Claim 1 is thus rejected under 35 U.S.C. §103(a) as being unpatentable over Yamazaki et al. together with Saraswat et al.

With respect to independent claim 2, Yamazaki et al. disclose a semiconductor device (see the entire patent, particularly the Figs. 1-4 disclosure) comprising: a substrate 101; a first thin film transistor having a first active layer 109/110 comprising

silicon (Si) formed over said substrate; and a second thin film transistor having a second active layer 111 comprising silicon formed over said substrate, wherein said second active layer contains no germanium, wherein said first thin film transistor constitutes a CMOS circuit (see column 4, lines 31-41).

Yamazaki et al's semiconductor device is an active-matrix circuit. The first thin film transistor having a first active layer 109/110 is part of a peripheral driver circuit and the second thin film transistor having a second active layer 111 is part of the matrix region.

The difference between Yamazaki et al's semiconductor device and claim 2's semiconductor device is Yamazaki et al's first thin film transistor's active layer 109/110 comprises silicon while claim 2's first thin film transistor's active layer comprises $Si_{1-x}Ge_x$ where $0<X<1$.

Saraswat et al. teach forming an active-matrix circuit's peripheral driver transistors from $Si_{1-x}Ge_x$ where $0<X<1$ instead of silicon, because the resulting transistors have significantly improved electrical characteristics, such as higher mobility (see the entire patent, particularly column 1, lines 20-58, and column 2, lines 19-43).

It would have been obvious to one skilled in this art to form Yamazaki et al's first thin film transistor's active layer 109/110 of $Si_{1-x}Ge_x$ where $0<X<1$ instead of silicon, in order to improve that driver circuit transistor's electrical characteristics, as taught by Saraswat et al.

Claim 2 is thus rejected under 35 U.S.C. §103(a) as being unpatentable over Yamazaki et al. together with Saraswat et al.

With respect to dependent claims 4 and 5, Saraswat et al's $Si_{1-x}Ge_x$ is

polycrystalline silicon germanium (see Saraswat et al's Abstract, for example) and Yamazaki et al's silicon 111 is polysilicon.

Claims 4 and 5 are thus rejected under 35 U.S.C. §103(a) as being unpatentable over Yamazaki et al. together with Saraswat et al.

With respect to dependent claims 10 and 11, Yamazaki et al's first active layer 109 and/or 110 further includes nickel at a concentration of $1x10^{15}$ to $1x10^{16}$ atoms/cm^3 (see column 5, lines 18-24).

Claims 10 and 11 are thus rejected under 35 U.S.C. §103(a) as being unpatentable over Yamazaki et al. together with Saraswat et al.

With respect to dependent claims 13 and 14, Yamazaki et al's semiconductor device is selected from the group consisting of a handy phone, a video camera, a mobile computer, a head mount display, etc. (see Yamazaki et al's Fig. 7 disclosure).

Claims 13 and 14 are thus rejected under 35 U.S.C. §103(a) as being unpatentable over Yamazaki et al. together with Saraswat et al.

With respect to independent claim 30, Yamazaki et al. disclose a semiconductor device having an active matrix display device (see the entire patent, particularly the Figs. 1-4 disclosure), said display device comprising: a substrate 101 having an insulating surface; a plurality of pixel electrodes arranged in a matrix formed over said substrate; a plurality of first thin film transistors for switching said pixel electrodes and formed over said substrate; a driver circuit formed over said substrate for driving said plurality of first thin film transistors, said driver circuit comprising at least one second thin film transistor; each of said first thin film transistors and said second thin film transistor comprising: a semiconductor film (111 for the first thin film transistors and 109 and/or 110 for the second thin film transistors) comprising silicon and including at

least one channel region; a gate insulating film adjacent to said channel region; and a gate electrode adjacent to said gate insulating film.

The difference between Yamazaki et al's semiconductor device and claim 30's semiconductor device is claim 30 recites: "wherein the semiconductor film of said second thin film transistor contains germanium and the semiconductor film of the first thin film transistors is not intentionally added with germanium and a concentration of germanium in the semiconductor film of the second thin film transistor is higher than a concentration of germanium in the semiconductor film of the first thin film transistor" (i.e., the difference is that the semiconductor film of Yamazaki et al's and claim 30's driver circuit transistors comprise silicon (Si) and $Si_{1-x}Ge_x$ where $0<X<1$, respectively).[3]

Saraswat et al. teach forming an active-matrix circuit's peripheral driver transistors from $Si_{1-x}Ge_x$ where $0<X<1$ instead of silicon, because the resulting transistors have significantly improved electrical characteristics, such as higher mobility (see the entire patent, particularly column 1, lines 20-58, and column 2, lines 19-43).

It would have been obvious to one skilled in this art to form Yamazaki et al's driver/second thin film transistors' active layer 109 and/or 110 of $Si_{1-x}Ge_x$ where $0<X<1$ instead of silicon, in order to improve the driver circuit transistors' electrical characteristics, as taught by Saraswat et al.

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3 The applicants' allegation: "The open ended nature of the claim allows for the possibility that the germanium is part of polycrystalline silicon germanium film," is somewhat misleading and contrary to the specification. Specifically, it is not merely a "possibility" that the germanium is part of the polycrystalline silicon germanium film; it is, to use the specification's own word, a "necessity" that the germanium is part of the polycrystalline silicon germanium film, as the specification makes clear throughout, particularly at page 6, lines 26-29: "At this time, although the adding conditions may be appropriately determined by the practitioner, there is a necessity of adding germanium to fulfill a composition of $Si_{1-x}Ge_x$ $(0<x<1)$," (emphasis added).

Claim 30 is thus rejected under 35 U.S.C. §103(a) as being unpatentable over Yamazaki et al. together with Saraswat et al.

With respect to dependent claim 31, the semiconductor film 111 of said plurality of Yamazaki et al's first thin film transistors is not added with germanium while the semiconductor film 109 and/or 110 of Yamazaki et al's driver/second thin film transistor is added with germanium (as per Saraswat et al's teaching, as explained above in the discussion of independent claim 30).

Claim 31 is thus rejected under 35 U.S.C. §103(a) as being unpatentable over Yamazaki et al. together with Saraswat et al.

With respect to dependent claim 32, Yamazaki et al's semiconductor device is selected from the group consisting of a handy phone, a video camera, a mobile computer, a head mount display, etc. (see Yamazaki et al's Fig. 7 disclosure).

Claim 32 is thus rejected under 35 U.S.C. §103(a) as being unpatentable over Yamazaki et al. together with Saraswat et al.

With respect to independent claim 33, Yamazaki et al. disclose a semiconductor device (see the entire patent, particularly the Figs. 1-4 disclosure) comprising: a substrate 101 having an insulating surface; a first thin film transistor formed over said substrate, said first thin film transistor comprising: a first semiconductor film 109 (or 110) comprising crystalline silicon formed over said substrate and having a channel region; a first insulating film adjacent to said first semiconductor film; and a first gate electrode 113 (or 114) adjacent to said first gate insulating film; a second thin film transistor formed over said substrate, said second thin film transistor comprising: a second semiconductor film 111 comprising crystalline silicon formed over said substrate and having a channel region; a second gate insulating film adjacent to said

second semiconductor film; and a second gate electrode 115 adjacent to said second gate insulating film.

Yamazaki et al's semiconductor device is an active-matrix circuit. The first thin film transistor having a first active layer 109 (and/or 110) is part of a peripheral driver circuit and the second thin film transistor having a second active layer 111 is part of the matrix region.

The difference between Yamazaki et al's semiconductor device and claim 33's semiconductor device is claim 33 recites: "wherein said first semiconductor film contains germanium at a higher concentration than said second semiconductor film and the second semiconductor film is not intentionally added with germanium" (i.e., the difference is Yamazaki et al's first thin film transistor's active layer 109 (and/or 110) comprises silicon while claim 33's first thin film transistor's active layer comprises $Si_{1-x}Ge_x$ where $0<X<1$).

Saraswat et al. teach forming an active-matrix circuit's peripheral driver transistors from $Si_{1-x}Ge_x$ where $0<X<1$ instead of silicon, because the resulting transistors have significantly improved electrical characteristics, such as higher mobility (see the entire patent, particularly column 1, lines 20-58, and column 2, lines 19-43).

It would have been obvious to one skilled in this art to form Yamazaki et al's first thin film transistor's active layer 109 (and/or 110) of $Si_{1-x}Ge_x$ where $0<X<1$ instead of silicon, in order to improve that driver circuit transistor's electrical characteristics, as taught by Saraswat et al.

Claim 33 is thus rejected under 35 U.S.C. §103(a) as being unpatentable over Yamazaki et al. together with Saraswat et al.

With respect to dependent claim 34, Yamazaki et al's first semiconductor film 109 (and/or 110) is added with germanium (as per Saraswat et al's teaching, as explained above in the discussion of independent claim 33) while Yamazaki et al's second semiconductor film is not intentionally added with germanium.

Claim 34 is thus rejected under 35 U.S.C. §103(a) as being unpatentable over Yamazaki et al. together with Saraswat et al.

With respect to dependent claim 35, Yamazaki et al's semiconductor device is selected from the group consisting of a handy phone, a video camera, a mobile computer, a head mount display, etc. (see Yamazaki et al's Fig. 7 disclosure).

Claim 35 is thus rejected under 35 U.S.C. §103(a) as being unpatentable over Yamazaki et al. together with Saraswat et al.

With respect to dependent claims 39-42, Yamazaki et al's first active layer 109 and/or 110 further includes nickel (see column 5, lines 18-24).

Claims 39-42 are thus rejected under 35 U.S.C. §103(a) as being unpatentable over Yamazaki et al. together with Saraswat et al.

With respect to dependent claims 44-47, each of Yamazaki et al's first and second active layers 109/110 and 111 further comprises nickel (see column 5, lines 18-24).

Claims 44-47 are thus rejected under 35 U.S.C. §103(a) as being unpatentable over Yamazaki et al. together with Saraswat et al.

With respect to independent claim 49, Yamazaki et al. disclose a semiconductor device (see the entire patent, particularly the Figs. 1-4 disclosure) comprising: a substrate 101; an underlying layer formed on the substrate (see column 3, lines 41-45); a first thin film transistor having a first active layer 109 (or 110) comprising silicon

(Si) formed over said substrate; and a second thin film transistor having a second active layer 111 comprising silicon formed over said underlying layer wherein said second active layer is not intentionally doped with germanium.

Yamazaki et al's semiconductor device is an active-matrix circuit. The first thin film transistor having a first active layer 109 (and/or 110) is part of a peripheral driver circuit and the second thin film transistor having a second active layer 111 is part of the pixel matrix circuit (see column 3, lines 31-39, and column 4, lines 31-41, for example).

The difference between Yamazaki et al's semiconductor device and claim 49's semiconductor device is Yamazaki et al's first thin film transistor's active layer 109 (and/or 110) comprises silicon while claim 49's first thin film transistor's active layer comprises $Si_{1-x}Ge_x$ where $0<X<1$.

Saraswat et al. teach forming an active-matrix circuit's peripheral driver transistors from $Si_{1-x}Ge_x$ where $0<X<1$ instead of silicon, because the resulting transistors have significantly improved electrical characteristics, such as higher mobility (see the entire patent, particularly column 1, lines 20-58, and column 2, lines 19-43).

It would have been obvious to one skilled in this art to form Yamazaki et al's first thin film transistor's active layer 109 (and/or 110) of $Si_{1-x}Ge_x$ where $0<X<1$ instead of silicon, in order to improve that driver circuit transistor's electrical characteristics, as taught by Saraswat et al.

Claim 49 is thus rejected under 35 U.S.C. §103(a) as being unpatentable over Yamazaki et al. together with Saraswat et al.

Claim 50 is rejected under 35 U.S.C. §103(a) as being unpatentable over Yamazaki et al. (United States Patent 6,160,271, already of record) together with

'Saraswat et al. (United States Patent 5,250,818, already of record) and Zhang et al. (United States Patent 5,648,277 cited in the Information Disclosure Statement filed March 4, 1999, hereinafter Zhang et al. '277).

Specifically, the difference between the obvious Yamazaki et al. / Saraswat et al. semiconductor device (discussed above with respect to independent claim 49) and dependent claim 50 is claim 50 recites that the underlying layer on the substrate is silicon oxide (Yamazaki et al. do not disclose the composition of its underlying layer).

Zhang et al. '277 teach that such an underlying layer is conventionally silicon oxide (see column 15, lines 1-4).

It would have been further obvious to one skilled in this art to form the obvious Yamazaki et al. / Saraswat et al. semiconductor device's underlying layer of silicon oxide, as taught by Zhang et al. '277.

Claim 50 is rejected under 35 U.S.C. §103(a) as being unpatentable over Yamazaki et al. together with Saraswat et al. and Zhang et al. '277.

Sameshima et al. (United States Patent 5,889,292) is relevant to this application.

Registered practitioners can telephone examiner Prenty at (703) 308-4939. Any voicemail message left for the examiner must include the name and registration number of the registered practitioner calling, and the application's Serial Number. Technology Center 2800's general telephone number is (703) 308-0956.

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